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Criteria for Evaluating a Well-Founded Scar on the Uterus after Cesarean Section

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Abstract The results of the conducted studies 102 of the manufacturer testify to the presence of essential clinical and echography, immunological and morphological features of the "wealthy" or "insolvent" scar on the uterus after the cesarean section. The correlation analysis with the calculation of the Correlation coefficient of Gamma (G) indicates a statistically significant relationship between the average degree between the way of the delivery and the scar thickness (G = -0.55, p = 0.001), strong correlation between the ultrasound data (G = 0.74, p = 0.002) and antibodies to type I collagen (G = 0.93, p = 0.003). Determining the level of antibodies to the type I collagen is the most important criterion confirming the usefulness of the scar on the uterus.

Keywords Cesarean section, Uterine scar, Pregnancy

1. Introduction

Caesarean section (CS) is the most common operation in obstetrics. The frequency of CS does not tend to decrease and ranges from 11 to 29%, reaching 40% or more in obstetric institutions that are collectors of obstetric pathology [2,6]. According to the WHO, an increase in the frequency of this operation by more than 16% did not significantly affect perinatal indicators, but at the same time increased maternal morbidity and mortality [4]. The increasing frequency of CS at the present stage has created the problem of managing pregnant women with a scar on the uterus and methods of their delivery. Over 30% of women who underwent CS plan a second pregnancy and childbirth, which in 60–90% of cases end with a second operation due to fear of rupture of the uterus along the scar [1,8].

At the same time, maternal morbidity with reoperation is 3-4 times higher than with vaginal delivery. The frequency of intraoperative complications with repeated CS is from 20.5 to 47.7%, which exceeds this indicator during the first CS by 5 times [6]. One of the possible ways to reduce the frequency of abdominal delivery is vaginal delivery after a history of operative delivery. According to the WHO, many women who were operated on during a previous birth give birth safely and without any difficulties [8,12]. The incidence of scar dehiscence, not accompanied by complications of the mother and the fetus, does not exceed 0.5%, ruptures of the uterus with life-threatening bleeding and complications for the fetus do not exceed 0.1% [3,9,10,11]. According to V.I. Krasnopolsky and V.E. Radzinsky (2019), up to 50-75% of women with a scar on the uterus after CS in the lower uterine segment in the absence of complications leading to the first CS and a satisfactory state of the scar can give birth naturally [5,7]. Summarizing the above, it can be stated that the choice of predictors of the viability of the uterine scar and the planning of labor through the vaginal birth canal is very relevant.

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2. Purpose of the Study

Determination of prognostically significant criteria for the state of the uterine scar after CS for possible planning of labor through the vaginal birth canal.

3. Material and Research Methods

To achieve this goal, prognostically significant clinical-anamnestic, instrumental and morphological criteria for assessing the state of the uterine scar were studied. The work is based on the analysis of the results of a comprehensive examination of 102 women in childbirth of reproductive age with one scar on the uterus, which are divided into 2 groups and the corresponding 4 subgroups who underwent one CS in the maternity ward of 1 clinic of Samarkand State Medical Institute (SamSMI) in the period from 2018-2020. Group I included 66 women with clinically and morphologically "consistent" scar on the uterus, which, in turn, were divided into 2 subgroups: 1A subgroup - 42 women in labor, who, after a complete clinical examination and the consent of the patients, delivered through the vaginal birth canal;

1B subgroup - 24 women in labor, after a complete clinical examination, refused to give birth through the vaginal birth canal and delivered by repeated CS.

Group II consisted of 42 women in childbirth who were admitted to the hospital on an emergency basis, which were also divided into 2 subgroups: subgroup 2A included 13 women in labor who entered the second stage of labor and delivered independently through the natural birth canal; 2The subgroup consisted of 24 women in labor with clinical signs of inconsistency of the scar on the uterus and they underwent repeated CS.

The inclusion criteria for the study were women in labor with a uterine scar after one cesarean section in the lower uterine segment. Exclusion criteria: - uterine scar after two or more caesarean sections; - preliminary corporal caesarean section or T and J-shaped incision in the uterus; - history of uterine rupture; - preliminary reconstructive surgery on the uterus, resection of the uterine angle, history of myomectomy; -the presence of other severe obstetric or extragenital pathology.

Along with general clinical research methods (assessment of the state of hemostasis, general analysis of blood and urine, smear for flora), special research methods were used, including ultrasound, dopplerometry of the lower uterine segment, enzyme immunoassay (ELISA) determination of the level of antibodies to type I collagen, morphological examination of rumen biopsy uterus.

Parturient women selected for attempted vaginal delivery received and signed informed consent after explaining the benefits and risks. An important factor in the selection was the positive attitudes of women to attempt vaginal delivery. Childbirth was carried out in readiness for an emergency and under constant CTG control. Pulse, temperature, respiratory rate and blood pressure were monitored.

Patients of the study groups were comparable in age, structure of extragenital and gynecological pathology, parity, indications for the first operation of the CS, the frequency and structure of purulent-septic complications after the first operation, the value of the time interval between the first operation of the CS and real pregnancy, the frequency and structure of complications of this pregnancy. and the degree of "maturity" of the cervix at the time of re-delivery.

4. Research Results and Their Discussion

In the obstetric department of 1 clinic of SamSMI for the period from 2018 to 2020. there was an annual increase in the total number of births from 3138 to 3280, and at the same time, an increase in the frequency of CS from 387 to 542 per year was noted, with women with a scar on the uterus predominating among them. In the main study group, the method of delivery was determined on the basis of a detailed study of the anamnesis (information about the previous operation, the course of the postoperative period, the presence of abortions), the analysis of the course of the present pregnancy, clinical and echographic data of the scar on the uterus, the intrauterine state of the fetus, desire and voluntary informed consent of the woman.

To resolve the issue of the possibility of self-delivery in pregnant women with a scar on the uterus, the state of the scar on the uterus and its usefulness, which was diagnosed by ultrasound at the stage of prenatal department with an assessment of blood flow in the scar zone, were of leading importance. The thickness of the myometrium was: 2.0–3.0 mm (2.12 ± 0.23 mm) - in 16 (25%); 3.0–4.0 mm (3.43 ± 0.34 mm) - in 32 (50%); 4.0–5.0 mm (4.12 ± 0.23) - in 12 (18.75%); 5-6 mm (5.18 ± 0.23 mm) - in 4 (6.25%) surveyed women in labor.

Of all women in labor who underwent Doppler examination of the lower segment in 2.1%, the resistance index was 0.59 ± 0.06 and 0.66 ± 0.07, respectively ($p < 0.001$), the pulsation index was 0.83 ± 0.10 and 1.27 ± 0.16, respectively ($p < 0.001$), diastolic ratio 2.04 ± 0.14 and 3.41 ± 0.19, respectively ($p < 0.001$), there were single vascular loci in the uterine scar. In 97.9%, satisfactory vascularization in the scar area was visualized.

To analyze the readiness for childbirth in 66 women in labor, the main group planning to give birth through the vaginal birth canal was determined by antibodies to type I collagen. For women in labor admitted in the second stage of labor (subgroup 2A), as well as for women in labor who were diagnosed with a clinically defective scar and delivered by repeated CS (subgroup 2B), antibodies to type I collagen were determined on the second day after birth.

Antibodies to type I collagen were determined by an indirect enzyme-linked immunosorbent assay (ELISA) on polystyrene plates (ELISA test) according to the classical method with modifications. The choice of ELISA as the main method is based on the facts that it is convenient and relatively easy to perform, has a high specificity and sensitivity [4]. The level of antibodies to type I collagen ranged from 0.05 to 32.7 IU / ml and averaged 17.5 IU / ml. The most frequently observed level of antibodies to type I collagen was in the range of 10.7-19.5 IU / ml - in 21% of pregnant women, a little less often 28.0-30.0 IU / ml - in 19% of pregnant women. In 12% it was 7.7-9.1 IU / ml, for 10% it was 5.6-2. IU / ml. Only 2% of pregnant women had a concentration of antibodies to type I collagen of 32.7-26.0 IU / ml.

Correlation analysis with the calculation of the Gamma correlation coefficient (G) revealed a statistically significant relationship of the average degree between the method of delivery and the thickness of the scar ($G = 0.55$, $p = 0.001$), a strong correlation between the research methods according to ultrasound data ($G = 0, 74$, $p = 0.002$) and anti-collagen antibodies ($G = 0.93$, $p = 0.003$), i.e. the thicker the scar and the lower the antibodies to type I collagen, the higher the likelihood of vaginal delivery. However, in 3% of women in subgroup IA, labor was complicated and they underwent a second CS, which was caused by asynclitic insertion of the fetal head and premature detachment of the normally located placenta.

Parturient women of the IB subgroup routinely delivered the second CS within 40 weeks and biopsies were taken intraoperatively for the morphological study of the scar. In a morphological study of biopsies of the lower uterine segment obtained during a repeated cesarean section in patients of subgroup IV, 92.3% of the structure was dominated by the muscle component, represented by bundles of smooth myocytes, between which there was dense fibrous connective tissue in the form of thin layers and wide fields with numerous vessels of various types, which indicates the morphological "maturity" of the scar tissue and the absence of sclerotic changes in the vessel wall.

In women in labor II B of the subgroup of emergency deliveries due to clinical signs of a threatening rupture of the uterus along the scar, manifested by the appearance of a characteristic pain syndrome, during a morphological examination of the tissues of the lower uterine segment, the biopsy was presented mainly by coarse-fibrous connective tissue with few pathologically altered vessels, areas of edema, hemorrhages and infiltration with leukocyte and fibroblastic cells. Single, unevenly stained smooth myocytes were arranged irregularly. In the study of the presence of collagen, the connective tissue was characterized by a pronounced expression of collagen fibers due to sclerosis of the vascular wall. Sclerotic changes in blood vessels during the formation of an "inconsistent" scar on the uterus prevent full regeneration of muscle tissue, leading to metabolic disorders and local tissue hypoxia with the development of coarse fibrous connective tissue. All women in labor in subgroup 2B showed an increase in the concentration of antibodies to type I collagen - 83% (5.0 ± 22.7 IU / ml).

Thus, the thickness of the uterine wall in the area of the scar according to ultrasound is a fairly significant diagnostic criterion for determining the "consistency" of the scar on the uterus. Thinning of the myometrium in this zone indicates the "inconsistency" of the scar. At the same time, the determination of the level of antibodies to type I collagen was the most significant criterion for the usefulness of the uterine scar.

5. Conclusions

The performed correlation analysis indicates a statistically significant relationship of the average degree between the method of delivery and the thickness of the scar on the uterus, a strong correlation between the ultrasound data and the level of antibodies to type I collagen. The greater the thickness of the scar and the lower the level of antibodies to type I collagen, the higher the likelihood of vaginal delivery in women with a history of one CS.

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